

REMARKS

Applicants respectfully requests entry of the amendments and remarks submitted herein. Claims 33 and 40 have been amended herein. Claims 11-13, 16, 17, 31, 32, 38, and 39 have been canceled and new claims 41-51 have been added. Support for new claims 41-51 can be found in the originally filed claims and throughout the specification. Attached is a marked-up version of the changes being made by the current amendments. Reconsideration of the pending application is respectfully requested.

Objections

The Examiner has objected to claims 33 and 40 for reciting non-elected inventions in the form of the non-elected sequences. Applicants have amended claims 33 and 40 to remove the reference to non-elected sequences. Therefore, Applicants respectfully request that the objection to claims 33 and 40 be withdrawn.

The 35 U.S.C. §112 Rejections

Claims 33-37 and 40 stand rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. This rejection is respectfully traversed.

The Examiner stated that the claims are drawn to a transgenic plant containing a nucleic acid sequence that encodes a polypeptide having at least 80% sequence identity to SEQ ID NO:2. The Examiner asserted, however, that it is unclear what the functional activity of such sequences would be. The Examiner concluded, therefore, that a plant comprising such a sequence has not been adequately described, given the uncertainty regarding the functional activity of any sequence having at least 80% sequence identity to SEQ ID NO:2. With respect to claims 37 and 40, the Examiner further asserted that the specification does not adequately describe which sequences that have at least 80% sequence identity to SEQ ID NO:2 would confer altered levels of very long chain fatty acids to a plant.

Applicants have amended claims 33 and 40 to recite that the "nucleic acid construct comprises a polynucleotide that encodes a polypeptide having at least 80% sequence identity to SEQ ID NO:2, wherein said polypeptide possesses β -ketoacyl synthase activity." Support for this functional language can be found, for example, at page 7, lines 4-6 of the specification. Given the amendments to claim 33, there is no uncertainty regarding the functional activity of any sequence having at least 80% sequence identity to SEQ ID NO:2. Furthermore, given the amendments to claim 40, there is no uncertainty regarding which sequences having at least 80% sequence identity to SEQ ID NO:2 would confer altered levels of very long chain fatty acids to a plant. Therefore, Applicants respectfully request that the rejection of claims 33-37 and 40 under 35 U.S.C. §112, first paragraph, be withdrawn.

The Examiner rejected claims 33-37 and 40 under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicants respectfully traverse this rejection.

The Examiner stated that while the specification discloses nucleic acid sequences encoding proteins having fatty acid elongase activity, there is no evidence provided that other sequences that encode polypeptides having at least 80% identity to SEQ ID NO:2 will have the same effect or any other effect when transformed into a plant. The Examiner further asserted that identification of related sequences that will encode enzymes having a specific activity is particularly problematic with enzymes involved in modifying fatty acids, and cannot be determined merely by similarity of DNA or amino acid sequences. The Examiner concluded that if sequences are identified only by similarity to other known sequences, one cannot conclude on this basis alone that these sequences also will encode a protein having said activity without additional evidence of the functionality or more knowledge of the particular structural features that are required for conferring this function.

The Examiner cited the DeLuca reference, the Van de Loo et al. reference, and the Broun et al. reference in support of this rejection. The Examiner stated that the DeLuca reference teaches the unpredictability of modifying metabolic pathways in a plant; that the Van de Loo et al. reference teaches that sequences encoding fatty acid hydroxylase activity are highly similar to

other sequences that do not encode a hydroxylase but instead encode a fatty acyl desaturase; and that the Broun et al. reference teaches that a change in only four amino acids will convert a desaturase gene to a hydroxylase gene.

Applicants have amended claims 33 and 40 to recite that the polypeptides encoded by the claimed nucleic acids possess " β -ketoacyl synthase activity." The recitation in claims 33 and 40 of functionality of the polypeptide encoded by the claimed nucleic acids allows for identification of those sequences encompassed by the claims.

The De Luca reference is a review article that describes general methods of altering secondary metabolic pathways. The De Luca reference was published five years prior to the priority date of the present application. The discussion in the De Luca reference regarding lipids and enzymes involved in fatty acid biosynthesis reports successful results in redirecting fatty acid biosynthesis products from long chain fatty acids to medium chain fatty acids (page 228N, left column, first full paragraph). Therefore, in the context of fatty acid synthesis, the De Luca reference actually supports enablement of the instant invention.

The Van de Loo et al. reference discusses the relationship between fatty acyl desaturases and fatty acyl hydroxylases. According to the Van de Loo et al. reference, such desaturases and hydroxylases appear to be related, but each exhibit particular substrate specificities. On the other hand, the presently claimed β -ketoacyl synthases add two carbon units to fatty acyl substrates of different lengths (see, for example, page 2, lines 1-16 of the specification). Desaturases and hydroxylases are very different enzymes than β -ketoacyl synthases, and therefore, the Van de Loo et al. reference is not relevant to enablement of the pending claims.

Similar to the Van de Loo et al. reference, the Broun et al. reference discusses the relationship between fatty acyl desaturases and fatty acyl hydroxylases. As Applicants described above with respect to the Van de Loo et al. reference, the activities and substrates of desaturases and hydroxylases are quite different than that of β -ketoacyl synthases. Therefore, as with the Van de Loo et al. reference, the Broun et al. reference is not relevant to enablement of the pending claims.

Given that the claims have been amended to recite that the polypeptide encoded by the claimed nucleic acid "possesses β -ketoacyl synthase activity," and given that the specification provides disclosure on assaying for β -ketoacyl synthase activity (see, for example, Examples 1,

2, and 4), it would not require undue experimentation by one of ordinary skill in the art to make and use the claimed invention. Accordingly, Applicants respectfully request that the rejection of claims 33-37 and 40 under 35 U.S.C. §112, first paragraph, be withdrawn.

Claims 33 and 34-37 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. This rejection is respectfully traversed.

The Examiner asserted that claim 33 was indefinite for reciting "a transgenic plant containing a nucleic acid," since, according to the Examiner, it is unclear if the plant has been transformed with the nucleic acid identified in the claims.

Applicants have amended claim 33 to recite "a transgenic plant containing a nucleic acid construct comprising a polynucleotide that encodes a polypeptide...." Therefore, it is clear from the amendments that the plant has been transformed with the nucleic acid construct.

Accordingly, Applicants respectfully request that the rejection of claims 33-37 under 35 U.S.C. §112, second paragraph, be withdrawn.

The Double Patenting Rejections

Claims 33-37 and 40 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 8-20, 44, 51 and 58 of U.S. Patent No. 6,307,128.

Applicants respectfully request that this rejection be held in abeyance until allowable claims have been identified. At that time, Applicants will submit a Terminal Disclaimer.

The 35 U.S.C. §102 Rejections

Claims 33-34 stand rejected under 35 U.S.C. §102(b) as being anticipated by Feldman et al. (*Mol. Gen. Genet.*, 1987, 208:1-9). This rejection is respectfully traversed.

The Examiner stated that the Feldmann et al. reference teaches a transgenic Arabidopsis plant, wherein a fatty acid elongase gene having at least 80% identity to SEQ ID NO:2 would be inherent therein and would have tissue-specific expression.

Applicants have amended claim 33 to recite that the transgenic plant contains a nucleic acid construct comprising a polynucleotide that encodes a polypeptide having at least 80% sequence identity to SEQ ID NO:2....” The Feldmann et al. reference does not teach an Arabidopsis plant that contains a nucleic acid construct that includes a polynucleotide encoding a polypeptide having at least 80% identity to SEQ ID NO:2. Therefore, the Feldmann et al. reference does not anticipate claims 33 and 34 as amended, and Applicants respectfully request that the rejection of claims 33 and 34 under 35 U.S.C. §102(b) be withdrawn.

CONCLUSION

Applicants ask that all claims be allowed. Enclosed is a \$110 check for a One-Month Petition for Extension of Time fee. Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claims 11-13, 16, 17, 31, 32, 38, and 39 have been canceled without prejudice to continued prosecution.

New claims 41-51 have been added.

Claims 33 and 40 have been amended as follows:

33. (Amended) A transgenic plant containing a nucleic acid construct comprising a polynucleotide that encodes a polypeptide [selected from the group consisting of: a polypeptide] having at least 80% sequence identity to SEQ ID NO:2, wherein said polypeptide possesses β -ketoacyl synthase activity [a polypeptide having at least 80% sequence identity to SEQ ID NO:4, a polypeptide having at least 80% sequence identity to SEQ ID NO:6, a polypeptide having at least 80% sequence identity to SEQ ID NO:12, and a polypeptide having at least 80% sequence identity to SEQ ID NO:14].

40. (Amended) A method of altering the levels of very long chain fatty acids in a plant, comprising the step of:

introducing a nucleic acid construct into a plant, wherein said nucleic acid construct comprises a polynucleotide that encodes a polypeptide [selected from the group consisting of: a polypeptide] having at least 80% sequence identity to SEQ ID NO:2, wherein said polypeptide possesses β -ketoacyl synthase activity [a polypeptide having at least 80% sequence identity to SEQ ID NO:4, a polypeptide having at least 80% sequence identity to SEQ ID NO:6, SEQ ID NO:8, SEQ ID NO:10, a polypeptide having at least 80% sequence identity to SEQ ID NO:12, and a polypeptide having at least 80% sequence identity to SEQ ID NO:14], wherein said construct is expressed and wherein said polypeptide is effective for altering the levels of very long chain fatty acids in said plant.